

PHARMACO-IMAGING FOCUS GROUP (PIFG)

"Knowledge is limited: Imagination encircles the world"
Albert Einstein

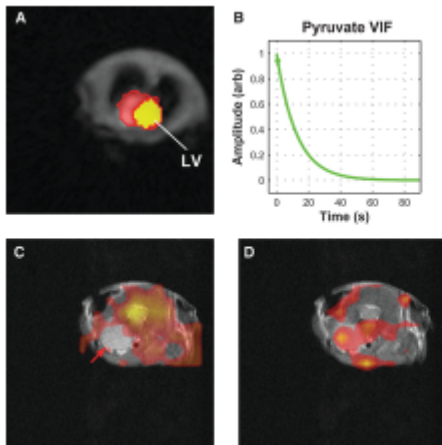
Quote of the Month – "Social and digital technologies are impacting how we think, how we act, and, perhaps even who we are." Paul Gordon Brown (speaker and educator, cited in his PhD dissertation)

And.....Introducing an NEW Newsletter SECTION!!!! "IMAGING APPLICATIONS"
contributed by Hanumantharao (Rao) Madala from Texas Tech University, Amarillo



Featured Image

Bankson, et al., Cancer Research 2015; 75(22):4708-17



Prior information and representative images from the model-based constrained reconstruction algorithm. A and B, segmentation of 1H MRI allows identification of the left ventricle (A) for constrained estimation of the pyruvate vascular input function (B). Once parameters are found, the kinetic model assists reconstruction of the distribution of HP substrates at arbitrary points in their observable life. Here, estimates for pyruvate (C) and lactate (D) are shown for $t = 6.4s$ after the start of data acquisition, which followed injection and flush of HP pyruvate. Red arrow, tumor.

Upco

- International Conference on Neuroimaging and Interventional Radiology: Open
- International Conference on Bioimaging: Sept 29, 2016
- International Conference and Expo on Radiology and Imaging: Open
- International Conference on Medical Imaging & Diagnosis: Open

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AAPS- PIFG web site: <http://www.aaps.org/Pharmaco-imaging/>
AAPS-PIFG LinkedIn: <https://www.linkedin.com/groups/3970151>

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Aug 23th 2 PM (ET) Teleconference Agenda:

- PIFG Chair Opening Remarks:
 - Laura Boles Ponto
laura-ponto@uiowa.edu

AGENDA for the meeting:

- 2:00-2:05 Brief introductions and attendance
- 2:05-2:15 PIFG Chair Laura Boles Ponto
- 2:15 – 2:20 Discussion on the PIFG Objectives led by Dr Ponto
- 2:20-2:40 – Newsletter review process
- 2:40-2:50 – Volunteers and postings
- 2:50–3:00 Any Other Business

Adjourn by 3:00 pm

**Conf Call every fourth Tuesday
of the even months at 2 PM:**

Next TCON:

Tues Aug 23rd @ 2 PM

GET INVOLVED IN THE PIFG!



We NEED volunteers!

- Become PIFG member
- **Image of the month –highlight your work**
- **Highlight your imaging facility in our Institution Spotlight in the next Newsletter**
- Recent citations
- Other ideas/ suggestions/ content

Contact us for the telephone number and pass code

Send stories, images, references, and your publication citations to the PIFG Newsletter editors

bmoyernh@gmail.com or Parul.Gupta@pfizer.com

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Editorial: The Role of Imaging in the Zika Crisis

The Zika virus has made its way from the tropics of Brazil to the Caribbean, including the US Territory of Puerto Rico, and we are all gearing up for a rather mild and inconsequential viral infection – unless you are pregnant. One in five of people infected with the Zika virus experience some form of fever, lassitude, muscle aches, etc., essentially a minor “flu-like” event. The same is actually true for women who are pregnant but the fetus undergoes a much more direct insult. The placenta appears to be a target tissue for the virus and developing neural tissue is also a primary reservoir. The result of a fetus infection can be serious with a condition called microcephaly, or essentially an absence of brain development. Secondly and as a consequence of the abnormal tissue development, the cranial brain casing morphometrics forces development of a solid casing around the delayed and minimal brain further preventing normal neural growth and development.

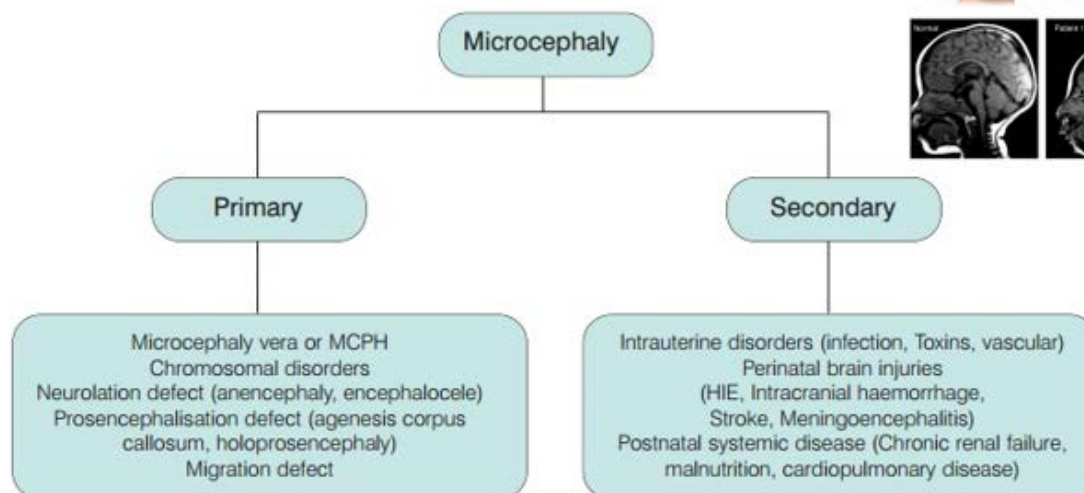
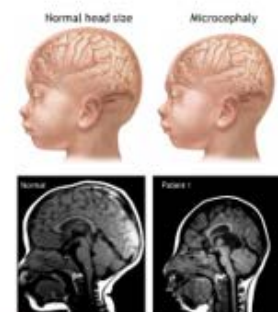
What can imaging provide here that can inform the mother and the physician on what is happening to an infected mother? Clearly WHEN the infection happens is important. If the mother is Zika POS before pregnancy begins, the virus has the most opportunity to inflict harm. An infection late in pregnancy may be less consequential to the result of microcephaly (“minimal brain”) but it is yet to be determined if such infected and affected babies have cognitive and other neurologic challenges. An early diagnosis of normal cranial development is critical. Do we use CT? No, only in an emergency – and we need multiple readings over time. CT is ionizing radiation which has negatives, especially in developing tissues, and the need for multiple measures over time and spatially as well, which make CT a poor choice. We need to know if the neuro development is arrested, and if bone formation is secondarily arresting further brain development we have two other alternatives: Ultrasound (US) and MRI. US is the preferred method cost-wise and even with less resolution than MRI, it affords quantitative measures.

Microcephaly is best described as:

Fig 1

Causes of microcephaly HIE: hypoxic ischaemic encephalopathy

Adapted from *Clinical Paediatric Neurology: A signs and symptoms approach* 4th edition Gerald M Fenichel.



The cranial development over weeks 26-40 of gestation is shown below. Note the cranial circumference at 26-30 weeks of gestation is near 240-270 mm and outliers of 3 SD make this 215 – 248 mm. Such a small delta is evident at this mid gestational time. We actually want to know a lot earlier such as at 8 weeks. The issue is clear - in the first and second trimesters the fetal dynamics of the growth rate and the multifactorial changes in the morphometry (brain shape) at head circumferences are steep and noisy making any clear diagnosis very difficult. Clear “out of bounds” measures before 26 weeks are fraught with error which makes accurate diagnosis difficult.

Fetus Head Circumference Ultrasound Microcephaly Calculator

Weeks	Average	1SD	minus 2 SD	minus SD3	# below 3SD	Total	Minus 3SD Per 1,000
26	243.4	9.4	224.6	215.2	1	209	4.8
27	254.1	9.7	234.7	225.0	0	518	0.0
28	262.9	9.4	244.2	234.8	3	1146	2.6
29	271.2	9.4	252.3	242.9	2	856	2.3
30	279.8	10.6	258.7	248.2	0	689	0.0
31	288.3	10.6	267.1	256.5	1	758	1.3
32	296.5	10.9	274.6	263.7	0	1262	0.0
33	302.6	10.7	281.2	270.4	0	918	0.0
34	309.1	11.4	286.3	274.9	0	835	0.0
35	314.5	11.5	291.6	280.1	0	982	0.0
36	320.3	10.5	299.3	288.8	1	1383	0.7
37	325.1	11.1	302.9	291.7	1	866	1.2
38	328.3	12.0	304.3	292.2	0	446	0.0
39 to 40	333.9	11.3	311.4	300.1	0	352	0.0
					9	11220	0.8

From: <http://www.babymed.com/tools/fetus-head-circumference-ultrasound-microcephaly-calculator>

It is clear that US is a preferred clinical measure, however, future strategies for medical intervention will require work in animal models together with highly precise measures of the 3-D morphometry and the degree of regional calcification affecting borders and neural pattern development. Imaging systems for the study for these events will have to be more definitive than US provides. MR and CT will have a role to play in defining these measures to add to the modeling of neural damage from Zika. Hopefully, we will have more precise tools (or algorithms) in these pre-clinical models to accurately measure and predict if medical countermeasures to the damaging effects on the brain or other medical interventions can attenuate the viral load or viral targeting to neural tissues.

Brian R. Moyer, PIFG Newsletter Editor

Additional Refs:

Hahn, FJ, et al., CT Measurements of cranial growth: Human subjects, AJNR, Mar/Apr 1984 and in AJR June 1984

<http://www.vox.com/2016/1/28/10861094/microcephaly-zika-virus-birth-defect-pregnancy>

also, from Aunt Minnie web site:

<http://www.auntminnieeurope.com/index.aspx?sec=sup&sub=mri&pag=dis&ItemID=613314>

MRI sheds light on Zika virus, severe joint deformities

By Philip Ward, AuntMinnieEurope.com staff writer

August 10, 2016 -- New research from Brazil has provided detailed information about the clinical, imaging, and electromyographic findings in babies with arthrogryposis associated with congenital Zika virus infection. More....

2016 Meetings of Interest

Meeting	Start Dates	End Date	Venue	Web Link
5th International Symposium on Focused Ultrasound	28-Aug-16	1-Sep-16	Washington DC	http://www.fusfoundation.org/symposium/
World Molecular Imaging Congress	7-Sep-16	10-Sep-16	New York	http://www.wmis.org/meetings/
The Future of Precision Medicine Molecular Imaging for Diagnosis and Surgery/Therapy	18-Sep-16	22-Sep-16	Wyoming	http://www.imagingin2020.com/
International Conference on Radiology and Imaging	19-Sep-16	20-Sep-16	Las Vegas	http://radiology.conferenceseries.com/
International Conference on Integrated Medical Imaging in Cardiovascular Diseases (IMIC 2016)	10-Oct-16	14-Oct-16	Austria	http://www-pub.iaea.org/iaea/meetings/50808/International-Conference-on-Integrated-Medical-Imaging-in-Cardiovascular-Diseases-IMIC-2016
Radiology & Imaging Conference (Fall)	19-Oct-16	21-Oct-16	Chicago	https://www.hlthcp.com/conferences/rad
International Conference on Medical Imaging and Diagnostics	20-Oct-16	21-Oct-16	Chicago	http://clinical-medicalimaging.conferenceseries.com/
Nuclear Science Symposium and Medical Imaging Conference	29-Oct-16	6-Nov-16	Strasbourg, France	http://2016.nss-mic.org/
Theranostics World Congress	7-Nov-16	9-Nov-16	Melbourne	http://www.theranostics2016.org/
Society for Neuroscience	12-Nov-16	16-Nov-16	San Diego	https://www.sfn.org/annual-meeting/neuroscience-2016
AAPS Annual Meeting	13-Nov-16	17-Nov-16	Colorado	https://www.aaps.org/annualmeeting/
Radiological Society of North America	27-Nov-16	2-Dec-16	Chicago	http://www.rsna.org/
EORTC-NCI-AACR Molecular Targets and Cancer Therapeutics Symposium	29-Nov-16	2-Dec-16	Munich	http://www.aacr.org/Meetings/Pages/MeetingDetail.aspx?EventItemID=61#.Vwbi1U8rLX4

AAPS Blog Highlights

From the AAPS BLOG Staff:

- [Greetings from Denver, Colorado: The Mile High City](#); John Carpenter

"Come to the [2016 AAPS Annual Meeting and Exposition](#) in November and see for yourself why Denver is one of the top travel destinations and [fastest growing](#) cities in the U.S. Millennials (and plenty of older folks, too!) are flocking to downtown Denver for work and a whole lot of playing. As you walk through the city, you will quickly experience the vibrant, lively culture and the friendly, welcoming western way of life. Admittedly, these days there are lot more hipsters than cowboys in downtown Denver, but the city's western heritage and pioneering spirit are evident in both the newest and the oldest parts of the city. And, of great importance to conference attendees, Denver has become a major center for outstanding chef-owned restaurants and other eateries and, of course, is world famous for its numerous craft breweries"

<https://aapsblog.aaps.org/>

- Brian Moyer, the Chairman for the 2016 National Biotech Conf, presented a talk on the Zika Crisis and the US Government and WHO response and has a new Blog Post on the Zika Virus at:

<https://aapsblog.aaps.org/2016/05/10/what-does-the-future-hold-for-the-zika-crisis/>

Imaging Center Highlight

UT Southwestern Medical Center

UT Southwestern Small Animal Imaging Resource (UT-SAIR) seeks to promote and facilitate small animal imaging related to models of human disease. UT-SAIR has three primary functions:

Provide state of the art small animal imaging equipment and infrastructure to support research, including consultation services as needed for the planning, performance, and analysis of studies

Focus on enabling multimodality imaging methods

Develop and implement new methods pushing the frontiers of small animal imaging in terms of spatial and temporal resolution and sensitivity.

<http://www.utsouthwestern.edu/research/core-facilities/sair/index.html>

Imaging Modality	Instrument	Location	Contact
Optical and Ultrasound	CRi Maestro (Fluorescence)	G1.218E	Ralph Mason, Ph.D. Email
	IVIS Spectrum (Bioluminescence and Fluorescence)	E6.236	
	IVIS Lumina (Bioluminescence and Fluorescence)*	NG2.302	
	VisualSonics Vevo-770 (Ultrasound)*	NG2.302	
PET/SPECT /CT	Siemens Inveon PET/CT	NE3.116	Xiankai Sun, Ph.D. xiankai.sun@utsouthwestern.edu">xiankai.sun@utsouthwestern.edu or Orhan Oz, M.D., Ph.D. orhan.oz@utsouthwestern.edu["(,"*)"]>*/
	BioScan NanoSPECT/CT Plus		
MRI	1T ASPECT	NE3.116	Robert Lenkinski, Ph.D. Email
	4.7T Agilent (Varian)	NE2.518	Shanrong Zhang, Ph.D. Email
	7.0T Agilent (Varian)	NE2.726	Masaya Takahashi, Ph.D. Email
	9.4T Agilent (Varian)	NE2.726	Todd Soesbe, Ph.D.

Images for your Desktop

Brian Moyer: Just for fun....A special boatload of glass balls at the Chihuly exhibit in Seattle..... Eye Candy!.



"Kilauea volcano in Hawaii is ready for its close-up....Cute Modicon!
<http://www.livescience.com/50717-amazing-images.html>

Animas River. In what was supposed to be a routine inspection, EPA officials released three million gallons of wastewater into one of Colorado's most scenic rivers. The wastewater--tainted with arsenic, cadmium, lead, and other metals--turned the Animas River sickly orange for days. The toxins still haven't completely dissipated, and the river's worst affected tributary is a Superfund Candidate
<http://www.wired.com/2015/12/the-year-in-science-images/#slide-1>

Consider
sending your
clicks too, we
will happily
showcase here



One of our ancestors appears to be flossing her teeth on a warm afternoon in San Diego Zoo:
Courtesy-Parul Gupta